

Appl. No. : 09/471,071
Filed : December 21, 1999

REMARKS

With this Amendment, Claims 8-23 and 25-32 are pending in the present application. Claims 8, 15, 17, 21, 25 and 29 have been amended, and Claims 31 and 32 have been added.

Rejection of Claims 8, 9, 11-23 and 25-30 Under 35 U.S.C. § 102

The Examiner rejected Claims 8, 9, 11-23, and 25-30 under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 6,309,915, issued to DiStefano (the DiStefano patent). Although Applicant does not necessarily agree with the Examiner's rejections, in order to expedite prosecution of the application, Applicant has amended independent Claims 8, 15, 17, 21, and 25. Claims 8 and 21 have been amended to describe a coefficient of thermal expansion range that is neither disclosed nor suggested in the DiStefano patent, and Claims 15, 17 and 25 have been amended to describe modulus of elasticity ranges in combination with coefficient of thermal expansion ranges that are neither disclosed nor suggested in the DiStefano patent.

In particular, the Examiner asserts that the DiStefano patent teaches a coefficient of thermal expansion (CTE) of less than about 100 to 150 ppm/°C (see Office Action, ¶ 2, referring to col. 7, lines 10-67, col. 8, lines 22-65, and Figs. 6 and 7 of the DiStefano patent). Applicant fails to find where the DiStefano patent teaches a CTE of less than about 100 to 150 ppm/°C for the compliant material 11, as the only disclosure Applicant finds for the CTE of the compliant material 11 is at col. 7, line 1, which discloses a CTE of 100 to 300 ppm/°C. By contrast, in certain non-limiting embodiments of Applicant's specification, the problem of thermally induced heel break can be substantially eliminated by providing a die attach layer having a CTE of less than about 200 ppm/°C, more preferably less than about 150 ppm/°C, and even more preferably less than about 100 ppm/°C. As described on page 9, lines 12-16 of the present application, this is due at least in part to the CTE of the die attach layer being lower, and therefore closer to that of the die or chip 10 and the tape 50 as described in the application. The DiStefano patent fails to recognize the desirability of having a lower CTE for its compliant layer, instead following the conventional approach of providing a highly compliant material for this layer. Accordingly, Applicant submits that Claims 8 and 21, which recite, *inter alia*, a coefficient of thermal expansion less than 100 ppm/°C, are patentable over the DiStefano patent.

The Examiner also asserts that the DiStefano patent teaches a die attach layer with a modulus of elasticity of 300 MPa to 600 MPa (i.e., about 50.8 to 100 ksi). Applicant first notes

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that the range of 300 MPa to 600 MPa, properly converted, is equal to about 43.5 ksi to about 87 ksi. These ranges do not anticipate the values provided, for example, in Claims 15, 17 and 25, which recite, *inter alia*, a modulus of elasticity of greater than about 100 ksi.

Applicant's specification describes at page 9, lines 23-29 that in addition to lowering the CTE of the die attach layer as described above, the problem of heel break may be further eliminated by providing the die attach layer with a modulus of elasticity greater than about 10 ksi, more preferably greater than about 50 ksi, even more preferably greater than about 100 ksi, and in one embodiment, up to about 126 ksi, as a higher modulus of elasticity will decrease the movement within the compliant layer, and will thereby decrease the stress at the heel. In contrast, the DiStefano patent teaches away from using a relatively high modulus of elasticity to address the same problem. After describing heel break, the DiStefano patent stresses the "need for a highly compliant scheme for interconnecting [a] chip to the external substrate" to solve the heel break problem (column 1, lines 45-55). This disclosure is consistent with other teachings in the art, described in prior amendments, which solve the heel break problem by providing a highly compliant attachment layer, rather than a more rigid layer with a lower CTE. As with these other teachings, the DiStefano patent nowhere describes the desirability of using a relatively high modulus of elasticity, with a lower CTE, to solve the problem.

For the reasons provided above, Applicant respectfully requests that the rejection of independent Claims 8, 15, 17, 21, and 25 be withdrawn.

Claims 9 and 11-14, 16, 18-20, 22-23, and 26-30 depend from independent Claims 8, 15, 17, 21, and 25, respectively. Therefore, these dependant claims are believed to be in patentable condition for the same reasons articulated above, and because of the additional features recited therein. For at least these reasons, Applicant respectfully requests that the rejection of Claims 9, 11-14, 16, 18-20, 22-23, and 26-30 be withdrawn.

Rejection of Claim 10 Under 35 U.S.C. § 103

The Examiner rejected Claim 10 under 35 U.S.C. § 103 as being unpatentable over the DiStefano patent in view of U.S. Patent No. 6,265,782, issued to Yamamoto (the Yamamoto patent). Applicant respectfully submits that amended Claim 8, from which Claim 10 depends, prevents a finding of obviousness based on a combination of the DiStefano and Yamamoto patents.

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The Examiner rejected Claim 8 as being anticipated by the DiStefano patent – that is, the Examiner asserted that DiStefano taught every element of Claim 8. The Examiner conceded that DiStefano did not teach the thickness limitation of Claim 10, and as a result, combined the Yamamoto patent with the DiStefano patent solely to propose that the thickness element would have been obvious. However, as described above, the DiStefano patent does not disclose or suggest every element of amended Claim 8, from which Claim 10 depends. Therefore, even in combination with the Yamamoto patent, the DiStefano patent fails to disclose or suggest every element of Claim 10. As stated in the M.P.E.P., “[i]f an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious.” M.P.E.P. § 2143.03. In addition, Applicant submits that Claim 10 recites a unique combination of features not taught or suggested by the cited art. As a result, Applicant respectfully requests that the rejection of Claim 10 be withdrawn.

Conclusion

The Applicant has endeavored to address all of the Examiner’s concerns as expressed in the outstanding Office Action. Although amendments have been made, no acquiescence or estoppel is or should be implied thereby. Rather, the amendments are made only to expedite prosecution of the present application, and without prejudice to presentation or assertion, in the future, of claims on the subject matter affected thereby. In view of the above remarks, the Applicant submits that the application is in condition for allowance and respectfully requests the same. If the Examiner finds any remaining impediment to the prompt allowance of these claims that could be clarified with a telephone conference, the Examiner is invited to initiate the same with the undersigned.

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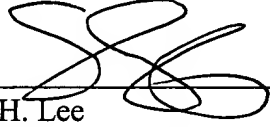
Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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